

WHAT IS CLAIMED IS:

1 1. A use of an isolated peptide of 40 or fewer amino acids, comprising a
2 sequence with at least 90% identity to a sequence TFSX₁LIX₂IFQ (SEQ ID NO:4), where X₁
3 and X₂ are independently selected from amino acids with a charge under physiological
4 conditions, and wherein said peptide, when presented as an antigen, raises antibodies which
5 bind to and cause destruction of pathologically adherent erythrocytes, for the manufacture of
6 a medicament to cause destruction of erythrocytes that adhere to vascular endothelial cells
7 due to a pathological condition.

1 2. A use of claim 1, wherein X₁ and X₂ are both negatively charged.

1 3. A use of claim 1, wherein X₁ and X₂ are both positively charged.

1 4. A use of claim 1, wherein X₁ and X₂ are both lysine.

1 5. A use of claim 1, wherein one or more of said amino acids is a D-
2 amino acid.

1 6. A use of claim 1, wherein said peptide has the sequence TFSKLIKIFQ
2 (SEQ ID NO:3).

1 7. A use of claim 1, wherein said pathological condition is selected from
2 the group consisting of diabetes, thalassemia, sickle cell anemia, and malaria.

1 8. A use of claim 1, wherein said medicament comprises antibodies.

1 9. A use of claim 8, wherein said antibodies are polyclonal.

1 10. A use of claim 8, wherein said antibodies are monoclonal.

1 11. A use of claim 10, wherein said monoclonal antibodies are humanized.

1 12. A use of a nucleic acid encoding an isolated peptide of 40 or fewer
2 amino acids, comprising a sequence at least 90% identical to a sequence TFSX₁LIX₂IFQ
3 (SEQ ID NO:4), where X₁ and X₂ are independently selected from amino acids with a charge
4 under physiological conditions, and wherein antibodies raised by said peptide bind to and
5 cause destruction of pathologically adherent erythrocytes, for the manufacture of a

6 medicament to cause destruction of erythrocytes that adhere to vascular endothelial cells due
7 to a pathological condition.

1 13. A use of claim 12, wherein X_1 and X_2 are both negatively charged.

1 14. A use of claim 12, wherein X_1 and X_2 are both positively charged.

1 15. A use of claim 12, wherein X_1 and X_2 are both lysine.

1 16. A use of claim 12, wherein said pathological condition is selected from
2 the group consisting of diabetes, thalassemia, sickle cell anemia, and malaria.

1 17. A method for lysing erythrocytes adherent due to a pathological
2 condition, said method comprising administering to a patient with said adherent erythrocytes
3 antibodies that specifically bind to a protein having an amino acid sequence
4 YETFSKLIKIFQDH (SEQ ID NO:5) on said erythrocytes, wherein binding of said
5 antibodies to said amino acid sequence results in destruction of said adherent erythrocytes.

1 18. A method of claim 17, wherein said pathological condition is selected
2 from the group consisting of diabetes, thalassemia, sickle cell anemia, and malaria.

1 19. A method for lysing erythrocytes adherent due to a pathological
2 condition, said method comprising administering to a patient with said pathologically
3 adherent erythrocytes an isolated peptide with at least 80% sequence identity to a sequence
4 $YX_1TFSX_2LIX_3IFQX_4X_5$ (SEQ ID NO:6), or a fragment thereof, which peptide or fragment
5 thereof, when presented as an antigen, raises antibodies which specifically bind to and cause
6 destruction of said pathologically adherent erythrocytes, wherein X_1 , X_2 , X_3 , X_4 and X_5 are
7 independently selected from amino acids that bear a charge at physiological pH,.

1 20. A method of claim 19, wherein X_1 and X_4 bear the same charge and X_2
2 and X_3 bear the same charge, but the charge borne by X_1 and X_4 is not the same as the charge
3 borne by X_2 and X_3 .

1 21. A method of claim 20, wherein the charge borne by X_2 and X_3 is
2 positive.

1 22. A method of claim 19, wherein X_2 and X_3 are lysine residues.

1 23. A method of claim 19, wherein said peptide has 100% sequence
2 identity to SEQ ID:6 and further wherein X₂ and X₃ are lysine residues, X₁ is a glutamic
3 acid, X₄ is an aspartic acid and X₅ is a histidine (SEQ ID NO:5).

1 24. A method of claim 19, wherein one or more of said amino acids is a D-
2 amino acid.

1 25. A method for lysing erythrocytes adherent due to a pathological
2 condition, said method comprising administering to a patient with said pathologically
3 adherent erythrocytes a nucleic acid encoding a peptide with at least 80% sequence identity to
4 the sequence YX₁TFSX₂LIX₃IFQX₄X₅ (SEQ ID NO:6), or fragment thereof which raises
5 antibodies which specifically recognize said peptide, wherein X₁, X₂, X₃, X₄, and X₅ are
6 independently selected from amino acids that bear a charge at physiological pH, wherein
7 expression of said peptide raises antibodies which specifically bind to and cause destruction
8 of said pathologically adherent erythrocytes.

1 26. A method of claim 25, wherein X₁ and X₄ bear the same charge and X₂
2 and X₃ bear the same charge, but the charge borne by X₁ and X₄ is not the same as the charge
3 borne by X₂ and X₃.

1 27. A method of claim 25, wherein the charge borne by X₂ and X₃ is
2 positive.

1 28. A method of claim 25, wherein X₂ and X₃ are lysine residues.

1 29. A method of claim 25, wherein said peptide has 100% sequence
2 identity to SEQ ID:6 and further wherein X₂ and X₃ are lysine residues, X₁ is a glutamic
3 acid, X₄ is an aspartic acid and X₅ is a histidine (SEQ ID NO:5).

1 30. A composition of an isolated peptide of the formula with at least 80%
2 sequence identity to a sequence YX₁TFSX₂LIX₃IFQX₄X₅ (SEQ ID NO:6), wherein X₁, X₂,
3 X₃, X₄ and X₅ are independently selected from amino acids that bear a charge at physiological
4 pH, and wherein antibodies raised by said peptide bind to and cause destruction of
5 pathologically adherent erythrocytes, and a pharmaceutically acceptable carrier.

1 31. A composition of claim 30, wherein X₁ and X₄ bear the same charge
2 and X₂ and X₃ bear the same charge, but the charge borne by X₁ and X₄ is not the same as the
3 charge borne by X₂ and X₃.

1 32. A composition of claim 30, wherein the charge borne by X₂ and X₃ is
2 positive.

1 33. A composition of claim 30, wherein X₂ and X₃ are lysine residues.

1 34. A composition of claim 30, wherein said peptide has 100% sequence
2 identity to SEQ ID NO:6 and further wherein X₂ and X₃ are lysine residues, X₁ is a glutamic
3 acid, X₄ is an aspartic acid, and X₅ is a histidine (SEQ ID NO:5).

1 35. A composition of claim 30, wherein one or more of said amino acids is
2 a D- amino acid.

1 36. An isolated peptide with at least 80% sequence identity to the sequence
2 YX₁TFSX₂LIX₃IFQX₄X₅ (SEQ ID NO:6) or fragment thereof, which peptide or fragment,
3 when presented as an antigen, raises antibodies that specifically bind to SEQ ID NO:5 and
4 cause destruction of pathologically adherent erythrocytes and wherein X₁, X₂, X₃, X₄ and X₅
5 are independently selected from amino acids that bear a charge at physiological pH.

1 37. An isolated peptide of claim 36, wherein X₁ and X₄ bear the same
2 charge and X₂ and X₃ bear the same charge, but the charge borne by X₁ and X₄ is not the
3 same as the charge borne by X₂ and X₃.

1 38. An isolated peptide of claim 36, wherein the charge borne by X₂ and
2 X₃ is positive.

1 39. An isolated peptide of claim 36, wherein X₂ and X₃ are lysine
2 residues.

1 40. An isolated peptide of claim 36, which peptide has 100% sequence
2 identity to SEQ ID NO:6 and further wherein X₂ and X₃ are lysine residues, X₁ is a glutamic
3 acid, X₄ is an aspartic acid and X₅ is a histidine (SEQ ID NO:5).

1 41. An isolated peptide of claim 36, wherein one or more of said amino
2 acids is a D- amino acid.

1 42. An isolated nucleic acid encoding a peptide with at least 80% sequence
2 identity to YX₁TFSX₂LIX₃IFQX₄X₅ (SEQ ID NO:6) or a fragment thereof, which peptide or
3 fragment, when presented as an antigen, raises antibodies that specifically bind to SEQ ID
4 NO:5 and cause destruction of pathologically adherent erythrocytes and further wherein X₁,
5 X₂, X₃, X₄, and X₅ are independently selected from amino acids that bear a charge at
6 physiological pH.

1 43. An isolated nucleic acid of claim 42, wherein X₁ and X₄ bear the same
2 charge and X₂ and X₃ bear the same charge, but the charge borne by X₁ and X₄ is not the
3 same as the charge borne by X₂ and X₃.

1 44. An isolated nucleic acid of claim 42, wherein the charge borne by X₂
2 and X₃ is positive.

1 45. An isolated nucleic acid of claim 42, wherein X₂ and X₃ are lysine
2 residues.

1 46. An isolated nucleic acid of claim 42, wherein said encoded peptide has
2 100% sequence identity to SEQ ID NO:6 and further wherein X₂ and X₃ are lysine residues,
3 X₁ is a glutamic acid, X₄ is an aspartic acid, and X₅ is a histidine (SEQ ID NO:5).

1 47. An isolated nucleic acid of claim 42 operably linked to a promoter.

1 48. An isolated nucleic acid of claim 46 operably linked to a promoter.

1 49. A composition of an isolated nucleic acid encoding a peptide with at
2 least 80% sequence identity to the sequence YX₁TFSX₂LIX₃IFQX₄X₅ (SEQ ID NO:6) or
3 fragment thereof, which peptide or fragment, when presented as an antigen, raises antibodies
4 that specifically bind to SEQ ID NO:5 and cause destruction of pathologically adherent
5 erythrocytes, wherein X₁, X₂, X₃, X₄, and X₅ are independently selected from amino acids that
6 bear a charge at physiological pH, and a pharmaceutically acceptable carrier.

1 50. A composition of claim 49, wherein X₂ and X₃ are lysine residues, X₁
2 is a glutamic acid, X₄ is an aspartic acid, and X₅ is a histidine (SEQ ID NO:5).